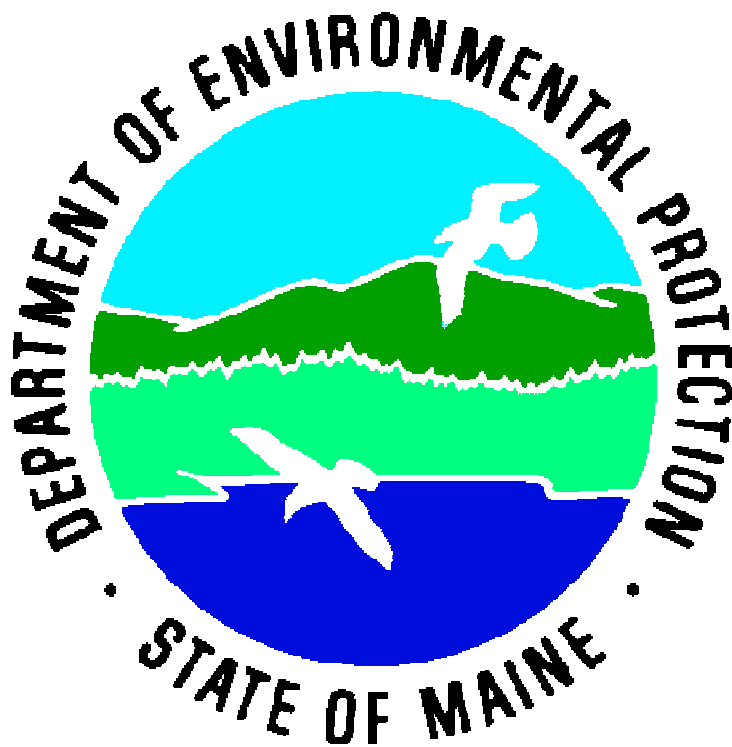


**State of Maine  
Department of Environmental Protection  
Clean Air Act Section 182 (f)  
NO<sub>x</sub> Waiver Petition**



**BUREAU OF AIR QUALITY**

**April 19, 2005**

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## I. Executive Summary

EPA previously granted the State of Maine a NO<sub>x</sub> Waiver for nine counties under the 1-hour Ozone National Ambient Air Quality Standard (NAAQS). Under EPA's ozone implementation rule Maine's previous 1-hour NO<sub>x</sub> waiver will remain in place for purposes of the 1-hour standard only. For purposes of a waiver with respect to EPA's 8-hour ozone standard, Maine must reapply for an 8-hour NO<sub>x</sub> waiver. Therefore, the Maine Department of Environmental Protection's Bureau of Air Quality (MEDEP) is requesting a NO<sub>x</sub> Waiver for the same counties (minus nonattainment areas) under the 8-hour Ozone NAAQS.

Per EPA guidance, photochemical grid modeling is not applicable in this case. Therefore, the analyses consist of emissions inventory data, back trajectories and wind frequency plots to demonstrate that the requested NO<sub>x</sub> Waiver area does not contribute to ozone nonattainment.

MEDEP is able to demonstrate that this area does not contribute to nonattainment of ozone in the 8-hour Ozone NAAQS Nonattainment areas within the Ozone Transport Region (OTR). Thus reductions of NO<sub>x</sub> emissions in the proposed NO<sub>x</sub> Waiver area are not necessary to bring the non-attainment areas in the OTR into attainment.

## II. Background Information

Oxides of nitrogen (NO<sub>x</sub>) emissions are precursors to ground level (tropospheric) ozone. When released into the atmosphere, NO<sub>x</sub> will react with volatile organic compounds (VOC) in the presence of sunlight to form ozone. Tropospheric ozone is an important contributor to the nation's urban and rural air pollution problem.

In 1997, the new 8-hour Ozone NAAQS was promulgated. Due to litigation, nonattainment designations under the standard were not posted in the Federal Register until April 30, 2004<sup>1</sup>. On June 15, 2004 the 8-hour Ozone designations became effective. The 1-hour ozone standard will be revoked on June 15, 2005. Maine's previous 1-hour NO<sub>x</sub> waiver remains in place, however, Maine must reapply for a waiver for purposes of the 8-hour standard. Therefore, Maine is submitting this NO<sub>x</sub> Waiver request based on the 8-hour Ozone NAAQS.

In 2004, the US Environmental Protection Agency (EPA) designated and classified 8-hour Ozone NAAQS nonattainment areas in Maine. Those areas are **Portland, ME** – Subpart 2 Marginal Nonattainment (includes: Sagadahoc county and parts of Cumberland, York and Androscoggin counties) and **Hancock, Knox, Lincoln and Waldo Counties** – Subpart 1 Nonattainment (includes parts of each of the counties listed in the name). In addition, pursuant to the Clean Air Act Amendments of 1990 (CAAA)<sup>3</sup>, the entire State of Maine is part of the OTR.

The CAAA made significant changes to the air quality planning requirements for areas that do not meet the Ozone NAAQS. Subparts 1 and 2 of Part D, Title I of the CAAA

contain the air quality planning requirements for ozone nonattainment areas. Title I includes requirements to control NO<sub>x</sub> emissions in certain ozone nonattainment areas and ozone transport regions. Section 182<sup>4</sup> (f) requires States to apply the same requirements to major stationary sources of NO<sub>x</sub> as are applied to major stationary sources of VOC's. The requirements include, for marginal and above nonattainment areas, New Source Review (NSR) for major new sources and modifications that are major for NO<sub>x</sub> (comprised of the Lowest Achievable Emission Rate (LAER), offsets, NSR).

Major stationary sources of NO<sub>x</sub> which are located in the OTR are subject to a 1.15 emission offset requirement (see CAA Section 182 (b) (5), 184<sup>5</sup> (b) (2), 182 (f) and is found in the MEDEP Regulations Chapter 113<sup>6</sup> (2) (C)). The 1.15 NO<sub>x</sub> emission offset requirement hinders economic sustainability and development in rural areas of Maine

### **III. Applicable EPA Guidance for NO<sub>x</sub> Control Requirement Exemptions**

The CAA specifies in Section 182 (f) (1) that NO<sub>x</sub> requirements shall not apply if the Administrator determines that any one of the following tests is met:

- ◆ In any area, the net air quality benefits are greater in the absence of NO<sub>x</sub> reductions from the sources concerned;
- ◆ In nonattainment areas not within an ozone transport region, additional NO<sub>x</sub> reductions would not contribute to ozone attainment in the area; or
- ◆ In nonattainment areas within an ozone transport region, additional NO<sub>x</sub> reductions would not produce net ozone air quality benefits in the transport region.

In addition, Section 182 (f) (2) (A) states that the application of the NO<sub>x</sub> requirements may be limited to the extent that any portion of those reductions is demonstrated to result in "excess reductions" of NO<sub>x</sub>. The NO<sub>x</sub> requirements of the conformity rules would also not apply in an area that is granted a Section 182 (f) exemption. In addition, certain NO<sub>x</sub> provisions of the I/M requirements would not apply in an area that is granted a Section 182 (f) exemption (not applicable to the areas currently seeking exemptions). The EPA's Guideline for Determining the Applicability of Nitrogen Oxides Requirements under Section 182 (f) describes how the EPA intends to interpret the NO<sub>x</sub> exemption provisions of Section 182 (f).

### **IV. Scope of Exemptions:**

If the EPA Administrator determines, under Section 182 (f) of the CAA, that additional reductions of NO<sub>x</sub> would not contribute to attainment of Ozone NAAQS, or are in excess to the reductions necessary for attainment, the area at issue shall automatically (i.e., a State would not need to submit an exemption request for each requirement) be exempt from the following requirements (as applicable): the NO<sub>x</sub> related general and transportation conformity provisions, NO<sub>x</sub> RACT, offsets, LAER, and nonattainment area

NSR for new sources and modifications that are major for NO<sub>x</sub>. Additionally, NO<sub>x</sub> emission reductions would not be required of an enhanced inspection and maintenance (I/M) program.

## **V. Basis of this Petition**

*The Maine DEP bases its petition on a demonstration that NO<sub>x</sub> emissions in the areas where a waiver is being sought are not impacting Maine's Marginal or Subpart 1 Nonattainment areas or other nonattainment areas in the OTR during times when elevated ozone levels are monitored in those areas. This conclusion is derived from the supporting analyses. As such, reductions in NO<sub>x</sub> emissions from the areas where a waiver is being sought are not necessary for attainment in these upwind areas and are excess to attainment under Section 182 (f) (2).*

Consistent with EPA's Section 182 (f) guidance, the State's excess emissions reductions demonstration is tied to the attainment demonstration SIP required by the CAAA.

The State of Maine will use various trajectory modeling in combination with surface wind and data analyses to demonstrate that NO<sub>x</sub> RACT, NSR, LAER, and offsets in the attainment areas of the State are excess to the reductions necessary to attain the NAAQS for ozone in the Marginal and Subpart 1 Nonattainment areas of the State and other nonattainment areas in the OTR.

## **VI. Introduction to Technical Discussion**

In Chapter 7 of the Guidance on Limiting Nitrogen Oxides Requirements Related to 8-hour Ozone Implementation<sup>7</sup>, EPA states that "photochemical grid modeling is generally needed to document cases where NO<sub>x</sub> reductions . . . include excess reductions." The next paragraph states: "It is important to note that EPA believes that photochemical grid models are not sufficient to assess incremental changes to areawide ozone concentrations from emissions reductions at a single or group of small sources. Emission changes should amount to some significant fraction of base emissions before modeling results can be interpreted with sufficient confidence that the results are not lost in the noise of the model and the input data. The EPA has reservations with respect to modeling NO<sub>x</sub> reductions at a single source or group of sources unless the modeling includes at least 10% of the domain-wide emissions." EPA retains the discretion to adopt approaches on a case-by-case basis that differ from the NO<sub>x</sub> Waiver guidance where appropriate.

Since the total annual NO<sub>x</sub> emissions for the entire State of Maine are small, only 3% of the OTR (minus Virginia), any reductions would be miniscule (see Appendix A). So it is consistent with EPA's position, stated above, that photochemical grid modeling is not a viable analysis for Maine at this time.

It is for these reasons that Maine is seeking a Section 182 (f) petition with the enclosed analyses for the following unclassifiable/attainment area consisting of: Aroostook,

Franklin, Oxford, Penobscot, Piscataquis, Somerset and Washington counties as well as parts of Hancock and Waldo counties of Maine (see Figure 1).

**Figure 1**

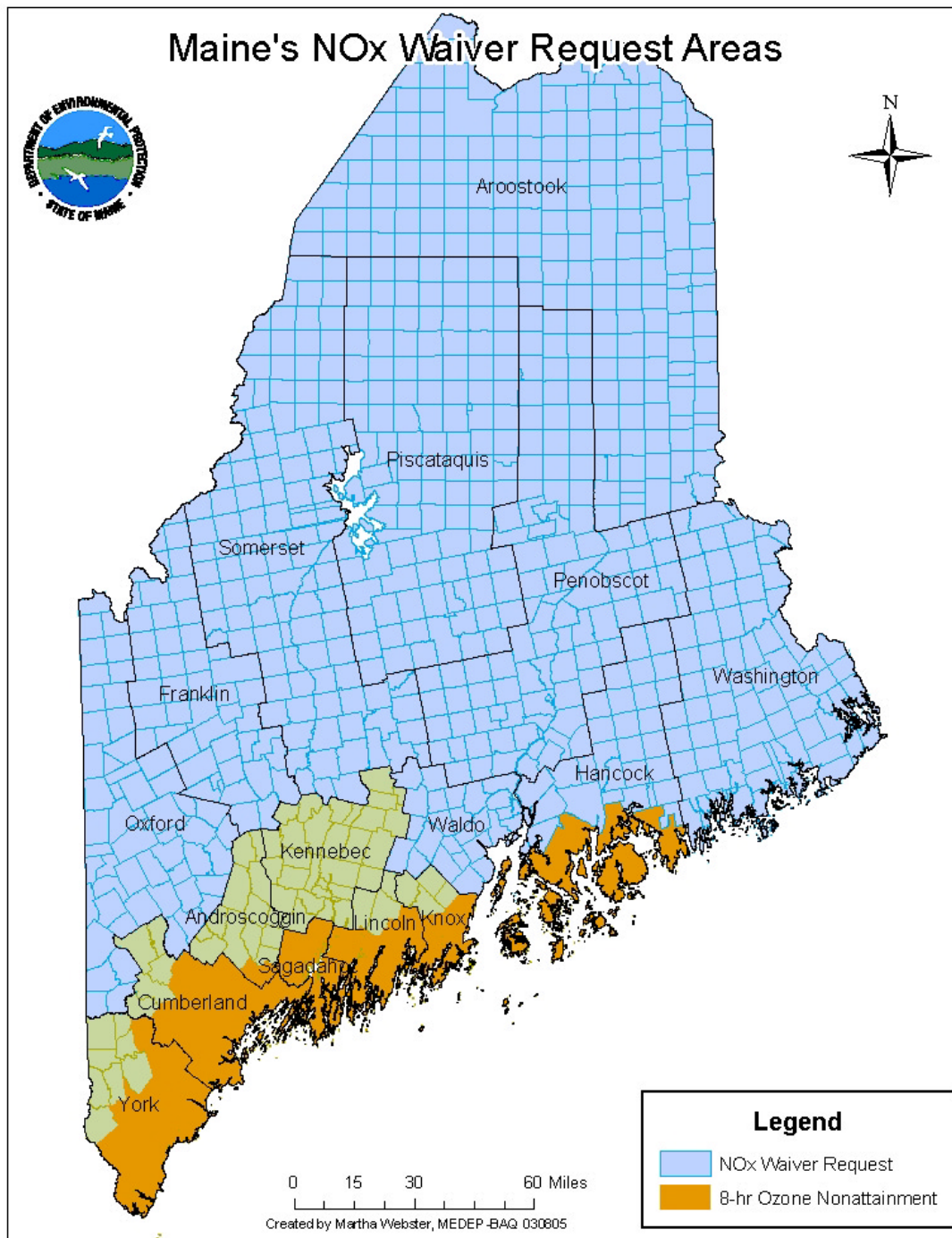


Figure 2 displays the individual 8-hour ozone design value trends for monitoring sites within the NO<sub>x</sub> Waiver area. As illustrated, the proposed NO<sub>x</sub> Waiver area has not had an 8-hour ozone design value which exceeds the standard. Therefore, there is almost no possibility that these rural areas will ever experience a violation of the current federal standard.

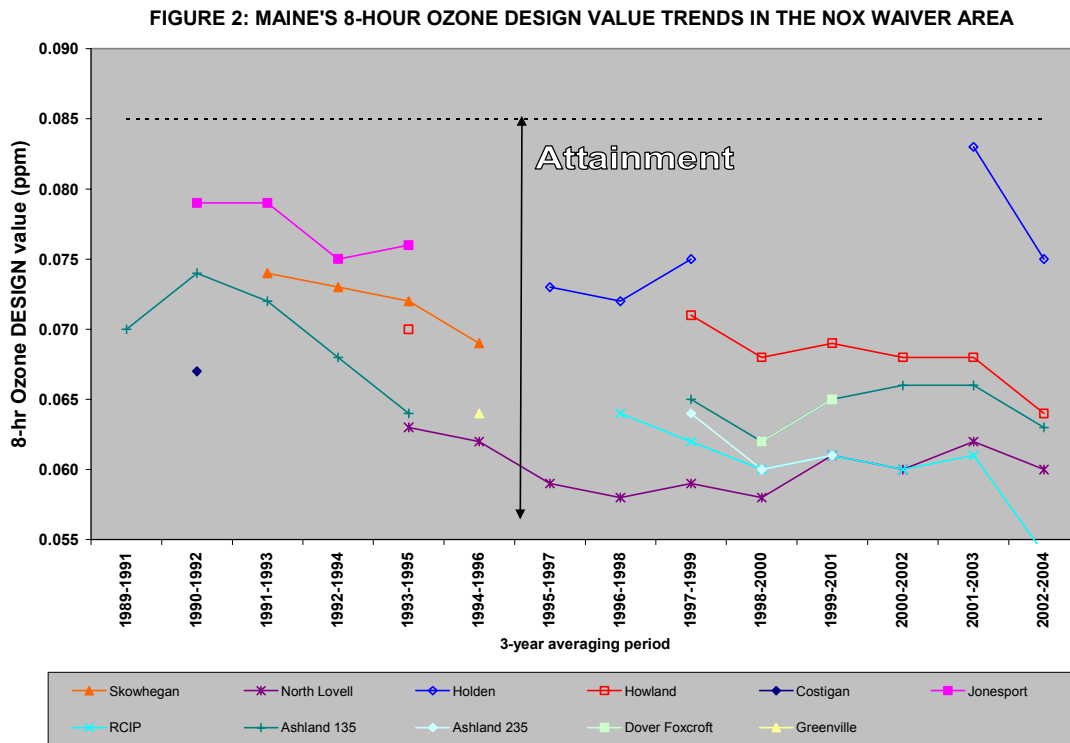
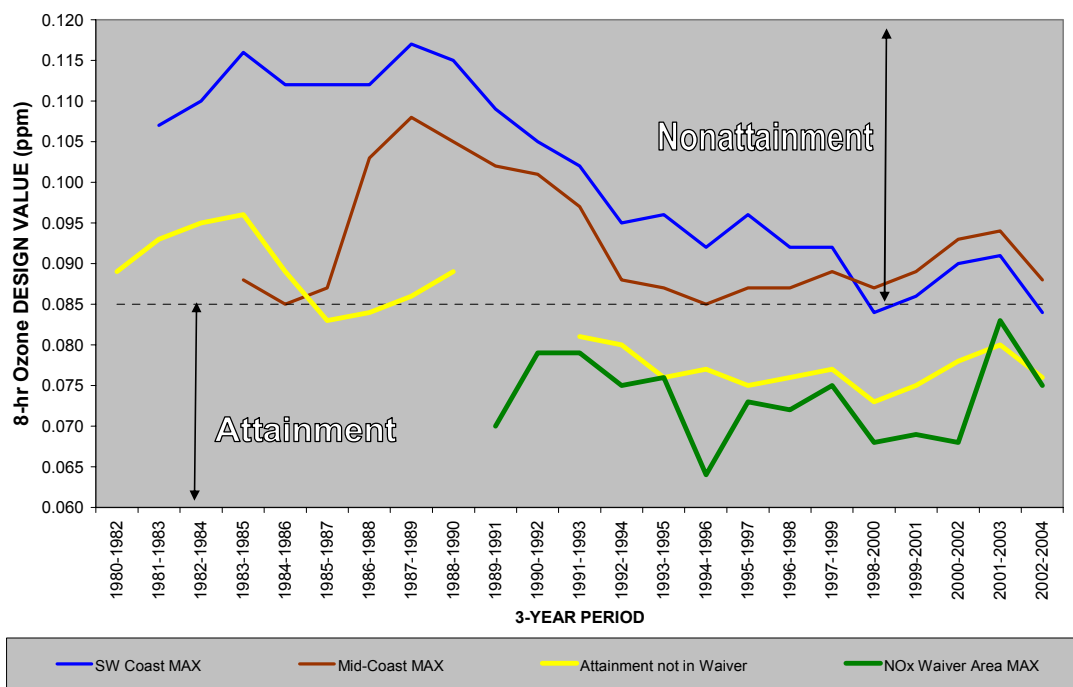


Figure 3 displays Maine's 8-hour ozone design value trends by area. 'SW Coast' is the Portland 8-hour Ozone NAAQS Nonattainment area; 'Mid-Coast' is the Hancock, Knox, Lincoln and Waldo Counties' 8-hour Ozone NAAQS Nonattainment area; and 'Attainment not in Waiver' is currently in a 1-hour Ozone NAAQS Nonattainment area and will eventually be in an 8-hour maintenance area. These three regions are graphed with the proposed NO<sub>x</sub> Waiver area to illustrate that the 8-hour ozone design values have been decreasing and the Southwest Coastal nonattainment area is currently monitoring attainment. Only the top of Cadillac Mountain in the 'Mid-Coast' nonattainment area is currently monitoring nonattainment.

FIGURE 3: 8-HR OZONE DESIGN VALUE TRENDS IN MAINE



## VII. Technical Documentation

The purpose of this technical document is to support a demonstration that stationary source emissions from the attainment areas in Maine do not contribute significantly to ambient ozone in excess of the NAAQS at ozone monitoring sites in the northeastern section of the OTR. Thus reductions of NO<sub>x</sub> emissions in these areas are not necessary to bring the non-attainment areas in the OTR into attainment.

Back trajectory analyses were calculated using the NOAA's Air Resources Laboratory HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory) model for two ozone monitoring sites in Maine and two ozone monitoring sites in Massachusetts. A brief description of HYSPLIT and these trajectories have been included in Appendix B.

Wind frequency maps were created using ARCMAP and superimposing wind frequency data plots created from Photochemical Assessment Monitoring Stations (PAMS) sites in Maine and Massachusetts. A description of the data handling and analyses has been included in Appendix C.



## **VIII. Summary of Results and Conclusions for this Petition:**

Technical analyses demonstrate that emissions from Maine's requested NO<sub>x</sub> Waiver area do not contribute to ozone transport or production in nonattainment areas as detailed below:

- NO<sub>x</sub> emissions from the area in Maine for which the MEDEP is seeking a waiver are much smaller than NO<sub>x</sub> emissions emanating from sources to the south and west. This disparity in total stationary source NO<sub>x</sub> emissions is readily apparent from the information presented in Appendix A.
- Examination of HYSPLIT back trajectories in Appendix B for sites in Maine support the contention that, NO<sub>x</sub> emissions from the area for which the waiver is requested do not contribute to high ozone levels in the OTR. These trajectories demonstrate that emissions significantly contributing to ozone transport and production in Maine's nonattainment areas come from large sources and urban areas to the southwest. Trajectories illustrate that ozone and its precursors are transported along the coast under favorable meteorological conditions (the analyses in Appendix C also illustrate this conclusion). Only 4.6% of the trajectories passed over a portion of the requested NO<sub>x</sub> Waiver Area. In all cases, (Figures B-26, B-33, B-34 and B-35) the air mass was descending as it passed over Oxford County and was later caught in coastal surface flows and transported to monitoring sites. To further illustrate the coastal surface flow, trajectories were created for these events by setting the model to compute trajectories on an isobaric (constant pressure) surface (Figures B-26a, B-33a, B-34a and B-35a). The surface flows illustrated in these figures passed through areas that are not part of the NO<sub>x</sub> Waiver Area. Thus, emissions from Oxford County do not contribute to the ozone monitored exceedances.
- The wind frequency maps in Appendix C demonstrate that NO<sub>x</sub> emissions from the area for which the waiver is requested do not contribute to high ozone levels in the OTR. These mapped wind frequency plots demonstrate that high ozone in Maine occurs under favorable meteorological conditions which transport ozone and its precursors from large sources and urban areas southwest of Maine. They further illustrate that Maine does not contribute to high ozone events in the rest of the OTR.